



Sewer Backup Prevention and Response Plan

May 31, 2017

Contents

1	Statement of Purpose	3
2	Terminology	4
3	Operations and Maintenance Program	5
3.1	Receiving and Responding to Complaints	5
3.1.1	Field Operations and Maintenance	5
3.2	Programmatic Inspection and Maintenance	7
3.2.1	SBU Operations and Analysis Program (SOAP)	7
3.2.2	Identifying Sewer Segments with Recurring Confirmed SBUs	7
3.2.3	Inspect, Determine Root Cause, Initiate Remedial Action	7
3.2.4	Capacity, Management, Operation, and Maintenance (CMOM) Section	8
4	Targeted Sewer Inspection Pilot (TSIP)	9
4.1	Pilot Development Phase (October 2016 through March 2017)	9
4.2	Pilot Phase (July 1, 2017 through June 30, 2020)	9
4.3	TSIP Implementation and Potential Expansion	10
5	Fats, Oils, and Grease	12
5.1	Grease Interceptors	12
5.2	FOG Remediation	12
5.3	Public Outreach	13
5.3.1	General Outreach to the Public	13
5.3.2	Outreach to Professionals	13
5.3.3	Residential Grease Outreach	13
5.3.4	Education Outreach	14
5.3.5	Intergovernmental	15
5.3.6	Sewer Report	15
	Appendix	16
	Appendix 1: SBU Response Checklist	16
	Appendix 2: SBU Procedure Flowchart	17
	Appendix 3: TSIP Pilot Development Phase Methodology	18

1 Statement of Purpose

As New York City's water and wastewater utility, the Department of Environmental Protection (DEP) provides vital services to more than eight million New Yorkers: delivering over one billion gallons of fresh drinking water and treating approximately 1.3 billion gallons of wastewater. To reliably treat this volume of wastewater DEP utilizes a network of more than 7,500 miles of sewers to convey wastewater to one of its 14 wastewater treatment plants. To operate and maintain the many components of this extensive sewer system, DEP has five repair yards, seven sewer maintenance yards, a fleet of specialized vehicles, and a staff of laborers, supervisors, engineers, and analysts.

Over the last decade, DEP has shifted from a reactive approach to an adaptive, data-driven, proactive approach to operate and maintain the sewer system. DEP employs the principles of adaptive management to continually improve our sewer maintenance program, while balancing the Department's overarching responsibility to deliver high quality drinking water and treat wastewater every day in an affordable and sustainable manner. DEP's rigorous sewer inspection, analysis, and cleaning program has produced tangible improvements to the level of sewer service citywide. In the last five years, we have achieved significant improvements in many of our key indicators, demonstrating the enhanced reliability of our system. For example, between Fiscal Year 2012 and Fiscal Year 2016, total sewer backup (SBU) complaints dropped 25% and Confirmed SBUs dropped 49%.

This plan outlines the steps DEP takes to manage SBUs and reduce their occurrence, from responding to and resolving SBU complaints to educating all New Yorkers about actions they can take to prevent the improper disposal of grease into the system, a primary cause of SBUs. This plan also describes a new pilot program DEP is implementing to conduct targeted sewer inspections in parts of the City that have a relatively higher rate of SBUs. Using the principles of adaptive management, DEP will evaluate the results of this pilot and identify additional opportunities to improve our overall sewer maintenance program.

2 Terminology

As used in this Plan, these terms are defined as follows:

Sewer Backup (SBU) complaint: A customer service request (CSR) by a property owner or other individual alleging that a problem with a City sewer is impacting the property and causing an SBU.

Confirmed SBU: DEP deems an SBU as confirmed when a backup complaint, upon field investigation, is determined to be associated with a condition in DEP's sewer system. Such conditions include surcharging, temporary overtaxing, blockages, and collapses.

Unconfirmed SBU: DEP deems an SBU as unconfirmed when a backup complaint, upon field investigation, exhibits none of the factors of a Confirmed SBU. In such situations, the SBU is found to be associated with an internal condition, a problem with the private sewer connection, or otherwise unfounded.

SBU Operations and Analysis Program (SOAP): A geospatial analysis of 311 data produced quarterly that indicates areas in the city experiencing repeated Confirmed SBU complaints and the actions associated with addressing those instances.

SBU Recurring After SOAP (SRAS): Once DEP completes remedial measures through SOAP, the sewer segment enters a one-year monitoring period. During that time, if an additional Confirmed SBU occurs on that segment, DEP identifies the segment as an SRAS segment and assigns it to DEP's Capacity, Management, Operation and Maintenance (CMOM) section to develop and implement an action plan tailored to site-specific conditions.

Sewer segment: the length of sewer from one manhole to the adjacent manhole. In cases where multiple barrels are present, the sewer segment generally includes all barrels.

Street segment: the portion of the street from one intersection to the next; may also be referred to as one street block.

3 Operations and Maintenance Program

DEP's program to ensure that the sewer system functions as designed relies on both reactive and proactive management tools. DEP both responds to complaints (reactive maintenance) and engages in data-driven analysis to undertake programmatic efforts to prevent problems (proactive maintenance). DEP uses a computerized maintenance management system and a geographic information system (GIS) to manage and track CSRs. DEP responds to CSRs generated externally through the 311 system, and can initiate a CSR internally to schedule preventative, corrective, or programmatic maintenance. DEP uses Infor Public Sector (IPS), previously known as Hansen, to track CSRs and any resulting work orders; DEP processes work orders in the same way regardless of the CSR's source or root cause.

When responding to a CSR or performing scheduled maintenance, DEP field crews are guided by DEP's Standard Operating Procedures (SOPs) and Guidelines. In addition to ensuring consistency and reliability across operations, these tools improve reporting by standardizing the collection of information about the root causes of SBU complaints.

3.1 Receiving and Responding to Complaints

Anyone can report observed or suspected SBUs to DEP through 311, New York City's government information and non-emergency services hotline. Operators at the 311 Call Center gather necessary information from the caller and enter the information into the online 311 system. Such reports may also be made electronically through the City's 311 website, and the IPS system will generate a CSR based on the complaint. Once IPS generates a CSR, it is routed to the appropriate maintenance yard. In addition to responding to individual CSRs, DEP also uses the IPS complaint data to target areas requiring maintenance and to evaluate the effectiveness of maintenance activities. DEP also employs GIS to analyze CSRs spatially.

3.1.1 Field Operations and Maintenance

DEP field crews perform investigations and respond to all sewer-related CSRs received from the City's 311 system. DEP evaluates conditions and takes immediate remedial action where conditions warrant using a variety of techniques and specialized equipment. Our forces maintain and operate some of the most sophisticated equipment in the industry to perform remedial work.

Field crews report to and are dispatched from one of seven maintenance yards located in the five boroughs. The yards are equipped with truck-mounted crane vehicles (catch basin cleaning trucks), power jet flushing vehicles, power-rodding auger trucks, and combined flusher/vacuum trucks. In response to an SBU complaint, a DEP field crew performs an initial inspection. This inspection includes visually surveying the downstream and upstream manholes nearest to the complaint location and collecting all data relevant to the incident. The field crews utilize a checklist during a response (see Appendix 1); a workflow chart is also used to assist crews (see Appendix 2).

The following summarizes how DEP field crews respond to an SBU complaint; the SBU Response SOP (December 2012), sets forth in detail the steps that field staff follow:

- If the manhole inspection determines that the SBU complaint was unconfirmed, the field crew may perform hydraulic cleaning for at least two sections of sewer as a “courtesy flush.” If a courtesy flush is not possible due to operational constraints or other extenuating circumstances during the initial response, the crew may return to the site at another time.
- If there is a Confirmed SBU, the field crew will perform hydraulic cleaning, i.e., flushing of the sewer line.
- If the flushing does not alleviate the condition, the crew performs mechanical cleaning (such as dragging, rodding, or vactoring) to remove material potentially obstructing flow in the sewer. The crew usually accomplishes this cleaning with the use of either a power-rodding auger truck or a combined flusher/vacuum truck.
- If the blockage is still not relieved, a pump around, which diverts flow around the sewer section experiencing the blockage, may be required. Pumping may be continuous or periodic depending on the amount of flow. If sewage is flowing past the blockage, pumping may not be required.
- If the crew determines that the sewer is broken, DEP will typically direct its on-call contractor to make the appropriate repair. In certain circumstances, broken sewers may be repaired by DEP field crews or as part of a capital project.
- If the crew determines that additional attention at the location will be required, it will so note and direct the work appropriately. For example, if the crew finds a location impacted by a significant amount of residential grease, it may recommend programmatic liquid degreasing; if commercial establishments are the suspected source, the crew may refer the location for inspections and possible grease enforcement. If the field crew has evidence that a problem exists but is unable to make a firm determination as to cause, it will refer the issue for further review by technical or senior engineering staff.
- Once the crew completes the appropriate steps outlined above, it will attempt to contact the complainant at the property. The crew will inform the complainant of whether the problem was resolved through the above actions, needs further action, or the backup relates to conditions within the property owner’s service line. If no one is available at the property, the crew will leave a door tag indicating what actions the crew took on-site.

Finally, as further described below in section 3.2, field crews routinely perform programmatic cleaning and degreasing of sewers in areas where data have indicated this to be necessary to maintain effective operations. Our processes are tiered to direct our resources as effectively and efficiently as possible, including referrals to specialized units that investigate and enforce issues such as grease conditions or perform more sophisticated analysis by engineering staff.

3.2 Programmatic Inspection and Maintenance

In addition to responding to complaints, DEP proactively analyzes Confirmed SBU data to identify and address areas where there are recurring Confirmed SBUs.

3.2.1 SBU Operations and Analysis Program (SOAP)

SOAP is an important element of DEP's sewer maintenance approach. SOAP consists of a series of analyses and activities that strategically target DEP's resources toward areas that most require attention. SOAP analyzes the geospatial distribution of Confirmed SBUs and highlights those street segments that have a higher frequency of Confirmed SBUs. Those segments that have the highest frequencies enter into the SOAP program for a more refined analysis, as described in more detail below.

3.2.2 Identifying Sewer Segments with Recurring Confirmed SBUs

DEP reviews Confirmed SBU IPS data on a quarterly basis to determine which sewer segments experienced the greatest number of Confirmed SBUs during that period. DEP identifies areas meeting criteria for further analysis, maintenance or engineering study as described in the *Management and Tracking of Recurring Sewer Backups* SOP and designates them as "SOAP Segments." DEP defines SOAP Segments as those street segments that have more than one Confirmed SBU within a rolling three-month period. DEP then issues CSRs on these locations to initiate the inspection and remedial process described in the following section, which includes a root cause analysis to determine the cause of the Confirmed SBUs and any appropriate remedial actions.

3.2.3 Inspect, Determine Root Cause, Initiate Remedial Action

Once DEP identifies a SOAP segment, it assigns the segment to the maintenance and operations staff for further review, inspection, and identification of actions that could potentially address the cause of the repeated Confirmed SBUs. A typical analysis includes the following steps:

1. **Inspection:** DEP undertakes additional inspections to analyze underlying factors that might be causing recurring Confirmed SBUs. DEP chooses an inspection method based on the nature of the sewer's history, physical surroundings of the sewer, and the sewer's size. Inspection methods include surface inspection using visual inspection or pole cameras, closed circuit television, SONAR, and walkthrough inspections by staff.
2. **Root cause identification:** Based on the results of the inspection, DEP identifies the most likely cause of the recurring Confirmed SBUs. A root cause may include obstruction from grease or debris build-up or from tree roots, a condition that requires repair, or the presence of an illegal connection that protrudes into the sewer and obstructs flow. DEP records any identified root cause in IPS, enhancing DEP's ability to analyze data and identify trends.

3. Remedial measures application: Once DEP identifies the root cause, it applies appropriate strategies to address the sewer issue. These actions may include application of liquid degreaser; cleaning on a one-time or scheduled programmatic basis; repairs, rehabilitation, replacement; and enforcement. Sewer cleaning methods include hydraulic flushing, mechanical dragging, rodding, or vactoring, and chemical degreasing procedures. DEP adds sewer segments that require cleaning on a programmatic basis to a Liquid Degreasing (“LDG”) list.

3.2.4 Capacity, Management, Operation, and Maintenance (CMOM) Section

DEP’s CMOM Section is a specialized unit that targets in-house engineering and contract resources to address sewer system performance issues. The CMOM section receives referrals concerning Confirmed SBUs via two main processes:

- 1.If, during initial CSR response, DEP determines that the condition warrants further investigation (requiring engineering services or closed circuit television [CCTV] inspection) to determine the cause of the issue; for example, when flow in the sewer is elevated above normal conditions but there is no obvious blockage or other defect causing the problem; or
- 2.By referral from SOAP when, after completion of the SOAP analysis and implementation of all prescribed remedial actions, the location experiences a Confirmed SBU within one year of the completion of those actions (an “SBU Recurring After SOAP” or “SRAS”).

For SRAS locations, the CMOM section conducts analyses tailored to the history of the location and the surrounding area to develop an appropriate corrective action plan. When evaluating the SRAS locations, DEP may enlarge the area subject to analyses if, through engineering judgment, DEP identifies potentially related Confirmed SBUs within a reasonable geographic area around the SRAS location.

Engineering personnel from CMOM conduct the evaluation and analysis of the SRAS location. The CMOM analysis uses tools such as CCTV to evaluate the structural integrity of the sewer, and uses engineering analysis of drainage plans and as-built drawings to ensure that the system is functioning as designed; CMOM personnel may also perform walkthrough inspections of larger sewers. In accordance with the results of its analysis, the CMOM section develops an action plan that recommends correction of any issues identified. Corrective actions recommended by CMOM may include programmatic degreasing, flushing, or repair or replacement of a portion of the sewer.

4 Targeted Sewer Inspection Pilot (TSIP)

To reduce further the number of Confirmed SBUs in the sanitary sewer system, DEP is piloting a proactive, data-driven sewer inspection program in targeted areas, which will include three phases. TSIP will supplement DEP's current SBU response system, including the existing SOAP, SRAS, and LDG maintenance programs, as described above (see sections 3.2.1, 3.2.3 and 3.2.4). TSIP is intended to (i) identify sewer segments that may benefit from frequent inspection and (ii) establish an appropriate cycle to conduct such inspections on an ongoing basis. By conducting proactive inspections of sanitary sewers in these sewer segments, DEP seeks to identify and undertake maintenance activities before a Confirmed SBU occurs with the goal of reducing the frequency of Confirmed SBUs. The two TSIP phases are:

1. Pilot Development Phase (completed) – DEP conducted inspections in areas selected for TSIP to determine the efficacy of various inspection methods and make preliminary resource projections for later phases of TSIP.
2. Pilot Phase – DEP will complete two cycles of regular inspections of all sanitary sewers in the selected geographic areas to collect data on the sewers' condition and establish an appropriate frequency of ongoing inspections for specific sewer segments.

After completion of the pilot phase, DEP will use the data collected and lessons learned to determine future implementation and potential expansion of TSIP.

4.1 Pilot Development Phase (October 2016 through March 2017)

DEP conducted a pilot development phase from October 2016 through March 2017. Additional details regarding this phase are presented in Appendix 3. During the pilot development phase, DEP compared two different methods of sewer inspection (visual inspection and pole camera inspection) to identify the most efficient method to conduct programmatic sewer inspections and to estimate the level of resources required for later inspection phases. DEP determined that more frequent visual inspections would net greater reductions in SBUs than the more sensitive, but more time-intensive pole camera inspections. Over time, DEP believes that the increase in the number of inspections through visual inspection will reduce the difference between visual and pole camera inspections in the rate of identifying recommended maintenance activities, and will allow for better identification of immediate maintenance needs or earlier identification of sewer surcharge conditions.

4.2 Pilot Phase (July 1, 2017 through June 30, 2020)

Using the information gathered in the pilot development phase, DEP will launch the pilot phase in July 2017, and perform two cycles of regular visual inspections of the sanitary sewers across geographic areas with the highest number of SBUs. To ensure that inspection crews can conduct a more detailed inspection if they deem such detailed inspection prudent, crews will have a pole

camera available during visual inspections. DEP anticipates, based on the pilot development phase, that it will take approximately three years to complete two full inspections of all sanitary sewer segments within the selected geographic areas.

DEP intends to conduct approximately 55,000 sewer segment inspections over the three-year pilot period. Based upon experience in the field and other relevant factors, DEP may adjust the number of annual inspections, but will seek to complete all 55,000 by June 2020. The current projected pace of annual inspections is:

1. Fiscal Year 2018 (July 2017 – June 2018) – 10,000 sewer segment inspections
2. Fiscal Year 2019 (July 2018 – June 2019) – 20,000 sewer segment inspections
3. Fiscal Year 2020 (July 2019 – June 2020) – 25,000 sewer segment inspections

To identify the sequence for sewer segment inspections, DEP will divide geographic areas into smaller drainage areas. DEP will inspect each sewer segment twice within the three-year pilot phase to establish the necessary inspection cycle. DEP will then conduct a detailed analysis of the inspection results to establish the appropriate ongoing inspection cycle for each segment. This analysis could include the consideration of factors such as age, material, and size of the infrastructure, the occurrence of Confirmed SBUs during the pilot phase, the observed conditions in sewers, the proactive maintenance performed, and clustering of geographic areas. DEP may add or remove some segments as appropriate. DEP will analyze the data on an ongoing basis throughout the pilot phase; DEP anticipates completing the analysis in October 2020, three months after the inspections are completed.

Once DEP has established the inspection schedule for sewer segments, DEP will initiate the implementation phase as described below. DEP will also analyze the inspection results and Confirmed SBUs throughout the TSIP to determine patterns of Confirmed SBUs against factors such as sewer size, age, design standard, and material to guide inspection protocols to target the City's sewer system, or areas within the system, that will most effectively reduce Confirmed SBUs.

4.3 TSIP Implementation and Potential Expansion

Beginning in November 2020, DEP will perform sewer inspections in the selected geographic areas in accordance with the inspection schedule established during the pilot phase. DEP will continue to evaluate the results of the inspections and make necessary changes to the inspection schedule to prevent Confirmed SBUs and utilize resources efficiently.

DEP will also consider the data collected during TSIP to evaluate how the lessons learned from this Pilot may be used to reduce SBUs in other parts of the City. In some cases, DEP may decide to conduct additional rounds of area-wide inspections, in accordance with the TSIP methodology, to identify the appropriate inspection cycles for the area. DEP may identify areas

in which the sewer conditions and root causes of SBUs mimic those in areas where DEP has already conducted TSIP. In these cases, DEP may elect to use the inspection frequencies already developed, rather than conduct additional rounds of area-wide inspections.

5 Fats, Oils, and Grease

Fats, oils, and grease (“FOG” or “grease”) buildup causes the majority of Confirmed SBUs in New York City sewers. DEP has a comprehensive grease management program to implement source controls for grease discharge, remediate sewer segments with grease buildup, and educate the public and plumbing professionals on best management practices for grease disposal.

5.1 Grease Interceptors

For Food Service Establishments (FSE), DEP’s sewer use regulations require all commercial establishments that generate fats, oils, and grease to install, operate, and maintain properly sized grease interceptors.¹ Upon the FSE’s installation of a grease interceptor, DEP inspects the establishment to verify the proper sizing, installation, and maintenance of the interceptor; periodic maintenance inspections then evaluate whether proper maintenance and cleaning of grease interceptors is occurring. When an inspector determines that an establishment is not complying with the regulations, DEP issues a Commissioner’s Order and/or Notice of Violation. Maximum penalties for non-compliance are \$10,000 per day. The Compliance Engineering Unit works with the Field Operations and CMOM units to identify commercial zones that correspond to segments with grease-related recurring SBUs and targets inspections accordingly.

DEP conducts random inspections of grease interceptors at FSEs throughout the city on a rolling basis. DEP also conducts targeted inspections when there are 311 complaints and when inspections within the sewer collection system determine that commercial grease is a problem. For the targeted inspections, DEP inspects all FSEs that might be contributing to an SBU. When violations are discovered (typically, an undersized grease interceptor or failure to maintain a grease interceptor), an enforcement action is initiated with a Commissioner’s Order and/or a Notice of Violation. The inspector will conduct follow-up inspections at the FSE until the property is in compliance. DEP may impose escalating penalties and requirements for increased interceptor cleaning frequency to ensure ongoing compliance and proper grease interceptor maintenance in the future.

5.2 FOG Remediation

When responding to an SBU complaint, field crews use a checklist to determine and record the primary cause of all Confirmed SBUs as described above. If the field crews determine the cause of a Confirmed SBU to be FOG deposits, they trigger the *FOG Referrals and Programmatic Scheduling* SOP. This SOP provides guidelines for relieving the sewer blockage using liquid degreaser, determining the severity of the deposit and source of the grease, and, if applicable, adding the segments to the LDG list. Field crews also distribute “Cease the Grease” flyers and door hangers to properties immediately surrounding the impacted segment or segments, as described below.

¹ 15 RCNY §19-11

5.3 Public Outreach

5.3.1 General Outreach to the Public

DEP has a broad community outreach program that includes all aspects of DEP's mission, including the operation of the City's sewer system. Through its website and social media tools, DEP provides a broad range of information to New Yorkers to assist them in maintaining their internal plumbing in a state of good repair. This information includes: instructions on best practices for proper home plumbing and service line maintenance; tips for preventing service line or sewer blockages and for cleaning up if sewage enters the home; and instructions on how to report an SBU complaint. The City also has a process in place through which a private property owner may file a claim with the New York City Comptroller for damage the property owner ascribes to sewer overflow.

5.3.2 Outreach to Professionals

DEP designs targeted outreach aimed at businesses, professional industrial and commercial support organizations, and business service providers such as Local Development Corporations, Business Improvement Districts, Chambers of Commerce, Economic Development Corporations, and Merchant Associations. DEP also communicates with licensed professionals, trade groups, and property owners about rules and regulations regarding discharges into New York City sewers. DEP hosts continuing education courses for Licensed Master Plumbers and regularly publishes articles in trade publications on updated rules and regulations related to sewer connections.

In conjunction with the proactive sewer inspection program described in Section 4, DEP offers consultation visits and compliance workshops to FSEs in the select geographic areas through Community Boards and elected officials. DEP also develops literature to alert the targeted community partners and residents about other deleterious items that can lead to SBUs, such as baby wipes, sanitary napkins, dental floss, and paper towels.

5.3.3 Residential Grease Outreach

DEP has a comprehensive public outreach program to complement the Grease Interceptor and FOG Remediation programs described above. The program aims to educate residents about proper grease handling and disposal.

DEP's residential grease prevention program, titled "Cease the Grease," focuses on educating property owners and residents about the negative impacts of grease discharge on the sewer system and building plumbing. DEP staff meets with property managers, co-op boards, tenants associations, and community groups to distribute "Cease the Grease" campaign materials, including flyers and messaged promotional items. Residents can request program materials through the DEP website and at DEP's borough offices.

Property managers, owners, and co-op boards of large residential buildings often experience the negative impacts of grease discharge in their private sewer lines and internal building plumbing

systems. DEP works with these groups to provide flyers and grease management tools to building residents. DEP also partners with the New York City Housing Authority (NYCHA) to distribute information across many NYCHA developments.

In addition to these community outreach efforts, in 2016, DEP launched an enhanced “Cease the Grease” outreach effort in Community Boards 412 and 413 in Queens, which have experienced an elevated number of SBUs, the primary root cause of which is grease deposits in the sewer system. As part of this effort, DEP reached 55,000 households in those Community Boards to distribute information and educate residents about the implications of improper grease disposal. DEP will consider expanding this enhanced program into other geographic areas, as appropriate.

In addition to door-to-door outreach to neighborhood residents, DEP offers community partners, including all NYCHA developments, presentations and workshops and/or literature.

5.3.4 Education Outreach

As part of the 2016 enhanced “Cease the Grease” outreach, DEP conducted a variety of programs at area schools. These initiatives included:

1. Consulting with school administrators and teachers regarding content and curriculum connections.
2. Teaching pre-K through 12th grade students during the school day, including hands-on activities and critical thinking exercises.
3. Developing online educational materials that included background information, teacher lessons, student activities, and additional resources including a glossary, bibliography, and descriptive list of organizations to support teachers and students.
4. Creating items for distribution to students to encourage community engagement and personal action to reduce grease in the sewers. These items included Grease Patrol Inspector badges (for distribution to elementary school students), MetroCard holders with a grease reduction message (for middle and high school students), and bookmarks (for all ages, including adults).
5. Constructing a working model of the inside of a home, with working plumbing to demonstrate the function of a fully working internal sewer pipe in contrast to a sewer pipe clogged by FOG.
6. Providing students with the opportunity to express themselves creatively about grease, urban infrastructure, and other water issues by participating in the annual Water Resources Art and Poetry Contest and focusing on this new theme.

DEP also plans to expand our education program to reach additional college and graduate students and non-formal educators from youth and community organizations, after-school

programs, libraries, cultural institutions, environmental groups, botanical gardens, parks, and other neighborhood resources.

5.3.5 Intergovernmental

DEP has built relationships with other New York City agencies to promote proper grease disposal and reuse. Grease interceptor installation is one of many components of the Small Business Services (SBS) program for FSEs. SBS coordinates the multi-agency permitting and inspection process for participating new businesses. The coordinated SBS inspection includes grease interceptor installation in addition to building, fire, and health code regulations. Likewise, grease interceptor installation and maintenance is included as a component in the NYC Business portal on how to start and maintain sustainable businesses.

The Business Integrity Commission (BIC) regulates haulers of yellow and brown grease in the City of New York. DEP partners with BIC to perform coordinated inspections of yellow (fryer) grease disposal practices as well as proper grease interceptor cleaning and maintenance.

5.3.6 Sewer Report

In November 2012, DEP released its first *State of the Sewers* report, most recently updated in 2016. The reports describe the history, components, and operation of all aspects of New York City's sewer system, focusing on the analytical tools and performance metrics that guide the agency's decision-making process, including those used to identify SOAP segments and to target programmatic cleaning schedules. Past reports have also highlighted many of the innovative tools and technologies that DEP employs to improve the operation and management of the sewer system. DEP will continue to publish an annual *State of the Sewer* report on our website that outlines performance by borough on key indicators.

Appendix

Appendix 1: SBU Response Checklist

Date: _____ Time Start/End: _____ / _____
CSR #: _____ WO#: _____
Address: _____
Nearest Manhole ID (upstream/downstream) _____ / _____
Manhole Condition ☐ Good ☐ Poor ☐ Needs Repair
Segment ID: _____ Sewer Diameter: _____
Responsibility: ☐ DEP ☐ Private Details: _____

CONFIRMED SBU (check one cause only):

☐ SBRGR: ☐ Residential Grease ☐ Commercial Grease
☐ SBUBR: ☐ Roots ☐ Debris ☐ Vandalism
☐ SBUDF: ☐ Collapse/Break ☐ Protruding Connection ☐ Root Infiltration

☐ SSTORN: ☐ Heavy ☐ Moderate ☐ Light

☐ STOTH: ☐ Water main ☐ Pump Station ☐ High Tide ☐ Other: _____
Break Malfunction

☐ SUPINV: ☐ Referral to CMOM Group ☐ Re-Inspection Required

UNCONFIRMED SBU:

☐ SSUN (Use when no condition found in city sewer)
☐ SBUNCI (Use when no condition found in city sewer and issue verified w/ homeowner)
☐ STEL (Use when resolved by telephone call)
☐ SCND (Cease and Desist) ☐ SCNDI (Request Cease and Desist Investigation)
☐ SRHOI (Request Health Order Investigation)

EFFECTS AND OTHER RELEVANT DATA (ALL INCIDENTS):

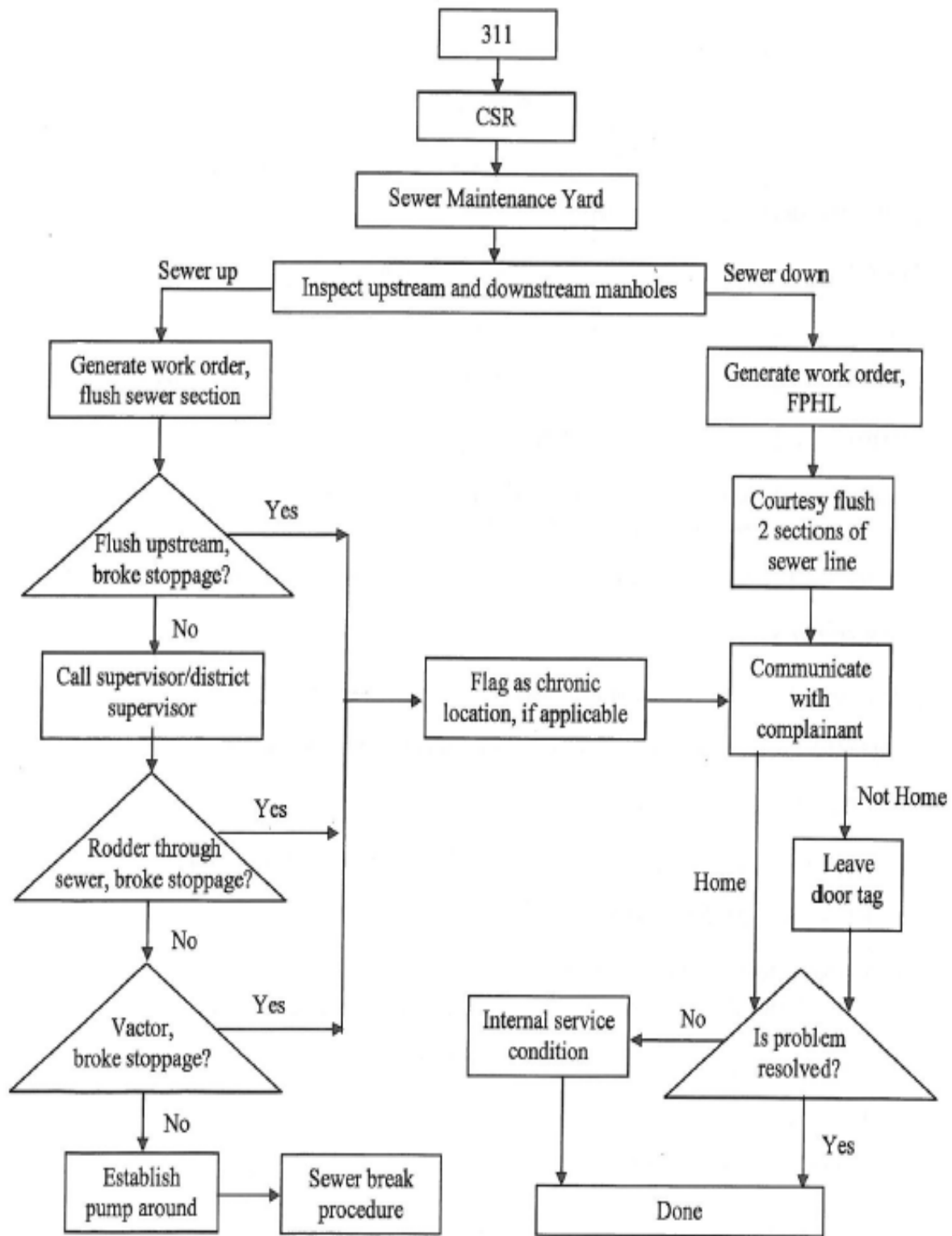
☐ Basement Flooding (Number of properties affected): _____
☐ Low Lying Area: _____ ☐ Suspected High Groundwater: _____

COMPLETED BY:

Name: _____ (Print) _____ (Sign)

Date: _____

Appendix 2: SBU Procedure Flowchart



Appendix 3: TSIP Pilot Development Phase Methodology

As set forth in DEP's Sewer Backup Prevention and Response Plan, in order to reduce further the number of Confirmed SBUs in the sanitary sewer system, DEP is piloting in targeted areas a proactive, data-driven sewer inspection program known as the Targeted Sewer Inspection Pilot (TSIP). The TSIP is proceeding in two phases: Pilot Development Phase and Pilot Phase. This Appendix provides further detail on the methodology DEP used to develop the TSIP during the Pilot Development Phase, which ran from October 2016 through March 2017.

The purpose of the Pilot Development Phase was to identify the most efficient method to inspect sewers and to estimate the level of resources required for later phases. DEP inspected a representative sample of sewer segments in two Community Boards in Brooklyn and two Community Boards in Queens, which represent neighborhoods with relatively higher rates of Confirmed SBUs. In this phase, DEP compared two different methods of sewer inspection: visual inspection and pole camera inspection. Pole camera inspections require additional equipment and are more time-intensive than visual inspections, but may identify additional maintenance needs in the sewers. The Pilot Development Phase sought to evaluate each inspection method and determine the best inspection protocol to employ during the Pilot Phase of the TSIP.

To collect enough data to make informed decisions about resource needs, DEP decided to inspect a minimum of 2.5% of all sanitary sewer segments in these Community Boards. The areas selected within these Community Boards are representative samples, with an average rate of SBUs compared to the rest of the Community Board. In addition, DEP selected areas that were not immediately adjacent to the Field Operations facility to ensure that it would not over-estimate productivity due to short travel times. DEP designated the representative areas near the top of the sewer system and drainage area to mimic how DEP will conduct inspections during the Pilot Phase of the program: inspection and maintenance will proceed from the highest portions of the sewer system to the lowest portion of the sewer system to mirror the most efficient maintenance protocol.

Inspections conducted during the pilot development phase utilized an inspection checklist, which DEP updated during the pilot development phase to reflect lessons learned. DEP has incorporated this inspection checklist into a mobile application to allow inspectors to record results on a tablet during the inspections and to create work orders directly in DEP's system.

To ensure that the field crews' inspection results were entirely independent, two different DEP crews inspected each sewer segment; one crew completed a visual inspection and the other crew completed a pole camera inspection. During both inspections, the field crews evaluated the sewer condition and identified necessary maintenance. DEP then compared the results of the two inspection methods to evaluate whether the more time-intensive pole camera inspections yielded significantly different results from those obtained by the visual inspections.

During the pilot development phase, DEP inspected approximately 870 sewer segments, identifying 182 maintenance activities via visual inspection and 213 maintenance activities via pole camera inspection. While the number of maintenance issues found with the pole camera, inspection method was 17% greater than the number of issues found with the visual inspection method, the pole camera inspections took approximately 48% longer to complete than visual inspections. Thus, utilizing the visual inspection method will allow DEP's field crews to conduct more inspections over a shorter time period than the pole camera inspection method would allow. However, inspection crews will have a pole camera available to them during the visual inspection to ensure that they can conduct a more detailed inspection if necessary. Therefore, DEP will utilize the visual inspection method for TSIP.

By conducting more frequent sewer inspections, DEP will have the opportunity to identify more maintenance activities over the course of TSIP. Over time, these more frequent inspections will reduce the difference in the number of identified maintenance activities between visual and pole camera inspections. In addition, more frequent visual inspections will allow for better identification of immediate maintenance needs, which will help to identify, prevent, and reduce the frequency of SBUs.